## SECTION 00 91 13

## ADDENDUM NO. 4

This Addendum modifies, amends, and supplements designated parts of the Bidding Documents and are hereby made a part thereof by reference. It shall be the responsibility of each Bidder to be familiar with the contents of this addendum and to notify, if necessary any Subcontractors and Suppliers they propose to use for various parts of the services of any changes or modifications contained in this Addendum. No claims for compensation, due to lack of knowledge of the contents hereof, will be considered. Bidders must acknowledge receipt of this Addendum in the Bid Form and comply with the requirements for submission of Bids as set forth in the Bidding Documents.

The sub-bid opening was held on Wednesday October 29, 2014 at 11:00 A.M. local prevailing time at the Department of Public Works, 135 Neil Street, Marlborough, MA 01752. The tabulation of sub-bids is included in **Attachment 1**.

**The answers below are provided in response to questions and comments submitted by prospective Bidders.**

*With the Erosion Controls section deleted, are we supposed to refer to the Drawings for erosion controls such as hay bales and silt fences?*

> Answer: Refer to Section 01 50 00 Temporary Facilities and Controls and the Drawings for erosion controls.

*Are they going to let us use power free of charge or not?*

> Answer: Contractor is required to arrange for and pay for power as needed. Refer to Section 01 50 00 Temporary Facilities and Controls.

*What is required for rebar in the duct banks?*

> Answer: Refer to Sheet S-001 General Notes and Details Sheet C-301 Civil Details 1.

*Who will be paying for the building permit?*

> Answer: The General Contractor shall pay for the building permit. Refer to Section 00 72 05 Standard General Conditions.

*What is the scope for the clarification equipment?*

> Answer: Refer to Sheet M-208 and Section 46 43 00 Clarifier Equipment. Section 01 11 00 Summary of Work has been revised and is included as part of this Addendum No. 4.

*There are no details on Sheet S-303. What are the concrete rustication lines depicted on Sheet A-301?*

Answer: Refer to Drawing Modifications to Sheet A-301 in this Addendum No. 4.

*Do the polymer and the sodium aluminate systems need to be kept operational or can we just take them out?*

Answer: The sodium aluminate system must remain in operation during the cold weather months (January through April). The polymer system may be demolished for the permanganate system at the Contractor's earliest convenience pending coordination with the Owner, Engineer, and Plant Operations Staff. Refer to Section 01 11 00 Summary of Work.

*Do you know the depth of the thrust block we are finding and increasing prior to the excavation of the UV Building?*

Answer: The General Contractor is responsible for performing a test pit at the 16-inch water line to expose the fitting and determine the location and extent of the thrust block. Refer to Sheet C-201, Civil General Notes.

*In the chemical systems that are being removed or converted, what is in the tanks for chemicals (qty)? Will the owner be removing and disposing of these chemicals?*

Answer: The General Contractor is responsible for the removal and legal disposal of removed equipment and material, including chemicals, not retained by Owner in accordance with Laws and Regulations. Refer to Section 46 33 00 Water Treatment Chemical Feed Equipment. The existing bulk storage containment volumes of the tanks are provided below for informational purposes only:

| Tank | Volume per Tank (gal) |
|---|---|
| Liquid Alum Bulk Tank | 5,000 |
| Liquid Alum Day Tank | 300 |
| Sodium Aluminate Bulk Tank | 3,000 |
| Sodium Aluminate Day Tank | 90 |
| Polymer Tank (2) | 140 |
| Dry Feed Slurry Mixing Tanks (2) | 50 |

*How many soda ash mix tanks are there?*

Answer: There are two mix tanks for the soda ash chemical feed system.

*Where is the air supply for the pneumatic valves? What is the scope of that work?*

Answer: The air supply for the pneumatic valves is the air compressor located in the Blower Room. Work for the pneumatic valves includes connecting to the existing compressed air piping.

*In the UV building are any construction joints required or will we be allowed to place the foundation walls in one placement?*

Answer: No foundation wall construction joints are shown. As per General Note B-4, "Construction joints other than as shown on the drawings shall be submitted to the Engineer for review." Refer to Sheet S-001 General Notes and Details.

*How much carbon is in each filter and how deep is it to the bottom?*

Answer: The dimensions of the individual filter structure are approximately 30 feet deep by 12 feet long by 12 feet wide. Provide sufficient filter media to fully furnish a media depth of four (4) feet in four (4) individual filter cells, including additional media to allow for top-off after rinsing and removal of fines, and accounting for normal wastage and loss. Refer to Section 46 61 00 Filtration Equipment.

*Since the existing raw water piping at the mag meter replacement is insulated, do we need to insulate the new piping?*

Answer: Yes, the new piping should be insulated. New insulation should match the thickness of the existing insulation. Refer to modification to Sheet M-204 in this Addendum No. 4.

*Would you consider a tab (wafer) style mixer if the mixer is able to operate well within the specified headloss at 3.6 MGD flows?*

Answer: Trapezoidal tab type mixing elements shall not be accepted. Refer to Section 46 41 17.

**NOTICE is hereby given that the Bidding Documents have been modified and replacement pages are issued herewith**.

## SPECIFICATIONS

- Delete Section 00 41 02 Form for General Bid entirely and replace with Section 00 41 02A4 Form for General Bid in Attachment 2.
- Delete Section 00 41 02.01 Annex to Form for General Bid entirely and replace with Section 00 41 02.01A4 Annex to Form for General Bid in Attachment 2.
- Delete Section 00 45 05 General Bidder's Representations and Certifications and replace with Section 00 45 05A4 General Bidder's Representations and Certifications in Attachment 2.

- Specification replacement pages identified in the following table are included as Attachment 2 to this Addendum No. 4, have an Issue Date of October 31, 2014 and contain reference to "ADDENDUM NO. 4" in the footers. Text changes are identified by double-underline for additions and ~~strikeout~~ for deletions.

| **Replacement pages (with text changes)** | **Provided for purposes of double-sided printing only - no changes (front or back of replacement page)** |
|---|---|
| 00 01 10-1 | 00 01 10-2 |
| 01 11 00-1 | 01 11 00-2 |
| 01 20 25-3 | |
| 31 00 00-2, 31 00 00-3, 31 00 00-5, 31 00 00-8, 31 00 00-9, 31 00 00-12 | 31 00 00-1, 31 00 00-4, 31 00 00-6, 31 00 00-7, 31 00 00-10, 31 00 00-11 |
| 32 31 13-1 | 32 31 13-2 |
| 40 94 43-1 | 40 94 43-2 |
| 46 33 00-2 | 46 33 00-1 |
| 46 41 1-1, 46 41 1-2, 46 41 1-3, 46 41 1-4, 46 41 1-5, 46 41 1-6 | |
| 46 43 00-1 | 46 43 00-2 |
| 46 61 00-1 | 46 61 00-2 |
| 46 66 00-5, 46 66 00-9, 46 66 00-10, 46 66 00-11, 46 66 00-12 | 46 66 00-6 |

## DRAWINGS

Drawing modifications are identified in the following table and do **NOT** involve replacement pages/sheets. Text changes are identified by double-underline for additions and ~~strikeout~~ for deletions.

| **Sheet No.** | **Modifications** |
|---|---|
| C-201 | - Add the following to Civil General Notes; "12. BEFORE EXCAVATION FOR PROPOSED UV BUILDING, PERFORM A TEST PIT ADJACENT TO THE SOUTHERLY EDGE OF THE CLEARWELL TO LOCATE CLEARWELL STRUCTURE."<br>- Add the following to Civil General Notes; "13. OPEN EXCAVATION WILL NOT BE ALLOWED ADJACENT TO THE EXISTING CLEARWELL." |
| A-301 | - Revise callout for WEST ELEVATION as follows; "CONCRETE RUSTICATION LINES – SEE DETAILS ~~E/S~~ G/A-303 (TYP)" |
| S-301 | - Add the following to Notes; "13. BEFORE EXCAVATION FOR PROPOSED UV BUILDING, PERFORM A TEST PIT ADJACENT TO THE SOUTHERLY EDGE OF THE CLEARWELL TO LOCATE CLEARWELL STRUCTURE." |
| M-204 | - Revise callout as follows; "16" CLDI SPOOL PIECE, AND RESTRAINED FLANGE ADAPTOR. PROVIDE PIPE SUPPORT AND REPLACE PIPE INSULATION IN KIND." |

This Addendum is provided to Bidders in a single Portable Document Format (.PDF) posted on the City's website and will be available for examination at the Issuing Office. It is each Bidder's responsibility to check the website for Addenda per the Instructions to Bidders.

Bidders must comply with the requirements for submission of Bids in the Instructions to Bidders and the Bidding Documents remain unchanged except as indicated above.

**Prepared and Issued by Woodard & Curran (Engineer) on behalf of:**
*City of Marlborough, MA (Owner)*
*Department of Public Works*

**END OF SECTION**

**ATTACHMENT 1**

**TABULATION OF SUB-BIDS**

Filed Sub-Bid Opening
October 29, 2014, 11:00 A.M. EST
City of Marlborough, Massachusetts
Millham Water Treatment Plant Upgrades, DWSRF 3885, Contract No. 1
Project 2015-13

| **Bidder** | **Price** | **Restrictions** | |
|---|---|---|---|
| | | May only be used by: | May be used by all Bidders except: |
| *Filed Sub-Bid Category: HVAC* | | | |
| Winston Builders<br>55 Hopkinton Road<br>Westboro, MA 01581 | $56,500.00 | Winston Builders Corp | |
| Waterline Industries<br>7 London Lane<br>Seabrook, NH 03874 | $64,677.00 | Waterline Industries | |
| Royal Steam Heater Company<br>499 Main Street - PO Box 427<br>Gardner, MA 01440 | $82,200.00 | | Waterline |
| CAM H.V.A.C. & Construction, Inc.<br>116 Lydia Ann Road<br>Smithfield, RI 02917 | $87,576.00 | | |
| Enterprise Equipment Co., Inc.<br>276 Libbey Parkway<br>Weymouth, MA 02189 | $109,900.00 | | |
| Apex Corp.<br>P.O Box 127<br>56 Charles Street<br>N. Abington, MA 02351 | $141,900.00 | | |
| Merrimack Valley Contractors, Inc.<br>118 Hampson Street<br>Dracut, MA 01826 | $145,700.00 | | |

Filed Sub-Bid Opening
October 29, 2014, 11:00 A.M. EST
City of Marlborough, Massachusetts
Millham Water Treatment Plant Upgrades, DWSRF 3885, Contract No. 1
Project 2015-13

| **Bidder** | **Price** | **Restrictions** | |
|---|---|---|---|
| | | May only be used by: | May be used by all Bidders except: |
| *Filed Sub-Bid Category: Painting* | | | |
| John W. Egan Co. Inc.<br>3 Border Street<br>West Newton, MA 02465 | $44,240.00 | | |
| Keltic Painting, LLC<br>189 Hill Road<br>Thompson, CT 06277 | $47,180.00 | | |
| Dandis Contracting, Inc.<br>1020 Turnpike Street, Suite 12<br>Canton, MA 02021 | $98,900.00 | | |
| *Filed Sub-Bid Category: Masonry* | | | |
| Dependable Masonry Construction Co., Inc.<br>73 Concord Street<br>North Reading, MA 01864 | $55,000.00 | | |
| D&S Commercial Masonry<br>45 Industrial Rd.<br>Wrentham, MA 02093 | $57,200.00 | | |
| ***Bid rejected due to incomplete bid security form***<br>**Marmelo Bros. Construction**<br>**13 Venture Drive**<br>**Dartmouth, MA 02747** | **$67,000.00** | | |
| D.P. Masonry, Inc.<br>1105 State Road<br>Westport, MA 02790 | $86,000.00 | | |
| LAL Masonry<br>SOMWBA Certified W.B.E.<br>390 Lincoln Avenue<br>Saugus, MA 01906 | $90,800.00 | | |
| Contracting Specialists,Inc.<br>453 South Main Street<br>Attleboro, MA 02703 | $119,250.00 | | TLT, G&R, GVW |

Filed Sub-Bid Opening
October 29, 2014, 11:00 A.M. EST
City of Marlborough, Massachusetts
Millham Water Treatment Plant Upgrades, DWSRF 3885, Contract No. 1
Project 2015-13

| **Bidder** | **Price** | **Restrictions** | |
|---|---|---|---|
| | | May only be used by: | May be used by all Bidders except: |
| *Filed Sub-Bid Category: Plumbing* | | | |
| Waterline Industries<br>7 London Lane<br>Seabrook, NH 03874 | $62,677.00 | Waterline Industries | |
| Enterprise Equipment Co., Inc.<br>276 Libbey Parkway<br>Weymouth, MA 02189 | $92,500.00 | | |
| Robert W. Irvine & Sons<br>147 Blosson Street<br>Lynn, MA 01902 | $114,700.00 | | |
| Royal Steam Heater Company<br>499 Main Street - PO Box 427<br>Gardner, MA 01440 | $175,000.00 | | Waterline Industries |
| *Filed Sub-Bid Category: Electrical* | | | |
| Waterline Industries<br>7 London Lane<br>Seabrook, NH 03874 | $337,677.00 | Waterline Industries | |
| Ostrow Electrical Co., Inc.<br>9 Mason Street<br>Worcester, MA 01609 | $499,500.00 | | |
| Fall River Electrical Associates Co., Inc.<br>74 Corneau Street<br>Fall River, MA 02721 | $531,000.00 | | Waterline Industries |
| Wayne J. Griffin Electric, Inc.<br>116 Hopping Brook Road<br>Holliston, MA 01746 | $555,400.00 | | |
| Ewing Electrical<br>3 North Rd - PO Box 370<br>Deerfield, NH 03037 | $587,900.00 | | |
| E.W. Audet & Sons, Inc.<br>169 Bay Street<br>PO Box 2039<br>Providence, RI 02905 | $589,000.00 | | |
| Metropolitan Corporation<br>840 Main Street<br>Millis, MA 02054 | $698,638.00 | | |

**ATTACHMENT 2**

**SPECIFICATIONS**
**REPLACEMENT PAGES**

## SECTION 00 41 02A4

## FORM FOR GENERAL BID

To the Awarding Authority:

A. The Undersigned proposes to furnish all labor and materials required for the Millham Water Treatment Plant Improvements which includes, but is not limited the work outlined in Section 00 11 16 Invitation to Bid, known as Contract #1 and corresponds with DWSRF Project number 3885, in accordance with the accompanying Plans and Specifications prepared by Woodard & Curran, for the Total Contract Price written below, subject to additions and deductions according to the terms of the Contract Documents.

B. This Bid includes Addenda numbered:_____

C. The proposed Contract Price (excluding sales and use tax) is:

**TOTAL PRICE FOR ITEMS G, OC1-OC3, S1-S5 and U1-U2**

$_____
*(in figures)*

_____ Dollars and
*(in words)*

_____ Cents
*(in words)*

D. The subdivision of the proposed Contract Price is as follows (excluding sales and use tax).

**Item G – Work of the General Contractor**
**(being all Work <u>other than</u> that covered in**
**<u>Owner's Contingency Allowances OC1-OC3, Unit Priced Items (U1-U2) and Sub-Bids Items S1-S5)</u>**

| | | |
|---|---|---|
| G | GENERAL CONTRACTOR Work for completing the Millham Water Treatment Plan Improvements Project as specified and shown on the Drawings. | $_____ |

## Items OC1 through OC3 –Owner's Contingency Allowances per Paragraph 11.02 of the General Conditions (excluding Item G and Sub-Bids Items S1-S5)

| | | |
|---|---|---|
| OC1 | Owner's Contingency Allowance: GENERAL CONTRACTOR Work for additional Work associated with thrust restraint on the high service finished water line. | Not to exceed $ 50,000.00 |
| OC2 | Owner's Contingency Allowance: GENERAL CONTRACTOR Work for additional Work associated with chemical feed systems. | Not to exceed $ 100,000.00 |
| OC3 | Owner's Contingency Allowance: GENERAL CONTRACTOR Work for additional work associated with filter rehabilitation and valve replacement. | Not to exceed $ 100,000.00 |

## Items U1 and U2-Unit Priced Items

| Item No. | Item Description with Unit Price in Written Words | Estimated Quantity & Unit | Unit Bid Price | | Total Bid Item Price | |
|---|---|---|---|---|---|---|
| | | | Dollars | Cents | Dollars | Cents |
| U1 | Filter Underdrain Grout Joint Replacement<br>@ _____<br>_____<br>Dollars and _____/100 PER LF | 168 LF | | | | |
| U2 | Rock Removal<br>@_____<br>_____<br>Dollars and _____/100 PER C.Y. | 10 C.Y. | | | | |

**TOTAL UNIT PRICED ITEMS (based on Unit Price Schedule above)**

_____

_____

_____ Dollars and _____/100 $_____

*(Use words)* *(Use figures)*

**Sub-Bid Items S1 through S5:**

| Sub-trade | Name of Sub-Bidder | Amount | Bonds required (Yes or No) |
|---|---|---|---|
| Item S1: Masonry | | $ | |
| Item S2: Painting | | $ | |
| Item S3: Plumbing | | $ | |
| Item S4: HVAC | | $ | |
| Item S5: Electrical | | $ | |

The Undersigned agrees that each of the above named Sub-Bidders will be used for the Work indicated at the amount stated, unless a substitution is made. The Undersigned further agrees to pay the premiums for the performance and payment bonds furnished by Sub-Bidders as requested herein and that all of the cost of all such premiums is included in the amount set forth in Item G of this Bid.

The Undersigned agrees that if selected as General Contractor, Undersigned will promptly confer with the Awarding Authority on the question of Sub-Bidders; and that the Awarding Authority may substitute for any sub-Bid listed above, a sub-Bid filed with the Awarding Authority by another Sub-Bidder for the sub-trade against whose standing and ability the Undersigned makes no objection; and that the Undersigned will use all such finally selected Sub-Bidders at the amounts named in their respective sub-Bids and be in every way as responsible for them and their Work as if they had been originally named in this General Bid, the total Contract Price being adjusted to conform thereto.

E. The Undersigned agrees that, if selected as General Contractor, Undersigned will within 5 days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the Awarding Authority, execute a Contract in accordance with the terms of this Bid and the Contract Documents and furnish a performance bond and also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority and each in the sum of the Contract Price, the premiums for which are to be paid by the General Contractor and are included in the Contract Price; provided however that if there is more than 1 surety company, the surety companies shall be jointly and severally liable.

The Undersigned hereby certifies that Undersigned is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work; that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that Undersigned will comply fully with all Laws and Regulations applicable to awards made subject to MGL Chapter 149, Section 44A.

The Undersigned further certifies under the penalties of perjury that this Bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection, the word “person” shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The Undersigned further certifies under penalty of perjury that the said Undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Chapter 29, Section 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or Regulation promulgated thereunder.

This Bid is submitted by the Undersigned.

**A Corporation**

Corporation Name: _____

State of incorporation: _____

Type: _____
(*General Business, Professional, Service, other*)

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

(CORPORATE SEAL)
Attest: _____
(*Signature of Corporate Secretary*)

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Date of qualification to do business as out-of-state corporation: _____

## A Limited Liability Company (LLC)

LLC Name: _____

State in which organized: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

**A Partnership**

Partnership Name: _____(SEAL)

By: _____
(*Signature of General Partner – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

**A Joint Venture**

First Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

Second Joint Venturer Name: _____

By: _____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

_____

Phone & Facsimile Nos: _____

Email address: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation and limited liability company that is a party to the joint venture should be in the manner indicated above.)

| |
|---|
| SUBMITTED ON: |
| State License No. (if applicable) |
| EIN/FEIN: |

**END OF SECTION**

This page intentionally left blank

## SECTION 00 41 02.01A4

## ANNEX TO FORM FOR GENERAL BID

1.01 The undersigned General Bidder acknowledges that the time period for holding Bids, *where Federal approval is not required* is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of Bids; and *where Federal approval is required*, the time period for holding Bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval. Notwithstanding the above, by mutual agreement, the General Bid will remain subject to acceptance for 60 days after the Bid opening, allowing for Federal approval if needed as stated above, or for such longer period of time that General Bidder may agree to in writing upon request of Owner.

1.02 The undersigned General Bidder proposes and agrees, if its General Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents, to perform all Work as specified or indicated in the Bidding Documents for the prices indicated in the General Bid and within the times indicated in the Bidding Documents, and in accordance with the other terms and conditions of the Bidding Documents.

1.03 General Bidder accepts all of the terms and conditions of the Bidding Documents including, without limitation:

A. those dealing with disposition of Bid security;
B. those included in the Supplementary Instructions to General Bidders;
C. insurance and bonding requirements (payment bond and performance bond each equal to 100% of the total Contract Price) set forth in the Standard General and Supplementary Conditions and Additional Supplementary Conditions, if any;
D. Contract Times as set forth in the Agreement; and
E. provisions for liquidated damages as set forth in the Agreement.

1.04 The following documents are submitted with and made a condition of the General Bid as acknowledged in the General Bid Submittal Checklist.

- 00 43 13 Bid Security Form
  OR required Bid security in the form of _____
- 00 43 36 Proposed Subcontractors Form
- 00 43 40 Information, Schedules and Data
- 00 43 93 General Bid Submittal Checklist
- 00 45 05 General Bidder's Representations and Certifications
- 00 45 19 Non-collusion Affidavit

- DCAMM Prime/General Certificate of Contractor Eligibility (sample included at the end of this Section)
- 00 45 55 DCAMM Prime/General Contractor Update Statement
- 00 45 58 Statement of Intent to Comply with the Department of Environmental Protection's Diesel Retrofit Program

1.05 Communications concerning the General Bid shall be addressed to:

Name _____

Title _____

Address _____

_____

Telephone No. _____

Facsimile No. _____

Email _____

| |
|---|
| SUBMITTED ON: |
| By: |
| *Authorized person per Form for General Bid* |

**END OF SECTION**

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LIEUTENANT GOVERNOR

*The Commonwealth of Massachusetts*
*Executive Office for Administration and Finance*
*Division of Capital Asset Management*
*One Ashburton Place*
*Boston, Massachusetts 02108*
*Tel: (617) 727-4050*
*Fax: (617) 727-5363*

JAY GONZALEZ
SECRETARY, ADMINISTRATION & FINANCE

CAROLE CORNELISON
COMMISSIONER

# Prime/General
# Certificate of Contractor Eligibility

**CONTRACTOR IDENTIFICATION NUMBER: 0000**

**This Certificate Shall Be Used for Submitting Prime/General Bids Only**

**1. CERTIFICATION PERIOD:** **This Certificate is valid from 1/1/2011 to 1/1/2012**

**2. CONTRACTOR'S NAME:** **Sample Contractor**

**3. CONTRACTOR'S ADDRESS:** **123 Main Street Anytown, MA 01234**

**4. WORK CATEGORIES:** This Contractor is certified to file bids under Massachusetts General Laws Chapter 149, Chapter 149A and Chapter 25A in the following checked Categories of Work:

| | | | |
|---|---|---|---|
| ☑ Alarm Systems | ☑ Elevators | ☑ Historical Masonry | ☑ Painting |
| ☑ Asbestos Removal | ☑ Energy Management Systems | ☑ Historical Painting | ☑ Plumbing |
| ☑ Deleading | ☑ Exterior Siding | ☑ Historical Roofing | ☑ Pumping Stations |
| ☑ Demolition | ☑ Fire Protection Sprinkler Systems | ☑ HVAC | ☑ Roofing |
| ☑ Doors & Windows | ☑ Floor Covering | ☑ Masonry | ☑ Sewage & Water Treatment Plants |
| ☑ Electrical | ☑ General Building Construction | ☑ Mechanical Systems | ☑ Telecommunication Systems |
| ☑ Electronic Security Systems | ☑ Historical Building Restoration | ☑ Modular Construction/Prefab | ☑ Waterproofing |

**5. EVALUATIONS:**

| | |
|---|---|
| Number of Projects Evaluated: | 12 |
| Average Project Evaluation Rating: | 92 |
| Number of Projects Below Passing Score: | 0 |

**6. PROJECT LIMITS:**

| | |
|---|---|
| Single Project Limit (SPL): | $2,500,000.00 |
| Aggregate Work Limit (AWL): | $5,000,000.00 |
| General Building Construction Limit: | N/A |

**7. SUPPLIER DIVERSITY OFFICE CERTIFICATION:** N/A

_____ _____

Taran Grigsby, General Counsel,
for Carole J. Cornelison, Commissioner

Approval Date

**NOTE TO CONTRACTORS**: *Complete Applications for Renewal of Contractor Eligibility are due no later than three months PRIOR to the Expiration Date of the Certification Period shown above. Failure to submit Completed Applications timely may result in a gap in Certification or a lapse in Certification altogether for your company.*

Reviewer's Initials _____

# SECTION 00 45 05A4

# GENERAL BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

**The undersigned, under the penalties of perjury, certifies and represents the following which is made a condition of the general Bid.**

## 1.01 General Bidder's Representations

A. General Bidder has examined and carefully studied the Bidding Documents and other related data identified in the Bidding Documents.

B. General Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. General Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. General Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Section 00 73 10 of the Additional Supplementary Conditions, Paragraph 4.02, as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Section 00 73 10 of the Additional Supplementary Conditions, Paragraph 4.06, as containing reliable "technical data."

E. General Bidder has considered the information known to General Bidder; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by General Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) General Bidder's safety precautions and programs.

F. Based on the information and observations referred to in Paragraph E above, General Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of the General Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. General Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. General Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that General Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to General Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which the General Bid is submitted.

## 1.02 General Bidder's Certifications

A. The General Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.

B. General Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid. General Bidder has not solicited or induced any individual or entity to refrain from bidding.

C. General Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish Bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

## 1.03 General Bidder's Certifications Required by Massachusetts General Law

A. General Bidder has submitted a certificate from the Secretary of State of the Commonwealth of Massachusetts that the corporation has complied with requirements of section 15.03 of subdivision A of Part 15 of chapter 156D and the date of compliance, and further has filed all annual reports required by section 16.22 of subdivision B of Part 16 of said Chapter 156D <u>if General Bidder is a foreign corporation</u>. General Bidder certifies it will provide such certificate for each Subcontractor that is a foreign corporation if it receives a Notice of Award.

B. General Bidder certifies under the penalties of perjury, to the best of their knowledge and belief, that all state tax returns have been filed and all State Taxes paid pursuant to M.G.L. c.62C, s49A. General Bidder has submitted a Certificate of Good Standing with respect to all returns due and taxes from the Commonwealth of Massachusetts Department of Revenue certifying General Bidder has complied with all laws of the relating to taxes, reporting of employees and contractors, and withholding and remitting of child support. General Bidder certifies it will provide such certificate for each Subcontractor if it receives a Notice of Award.

C. General Bidder certifies that if awarded the Contract, the following will be submitted prior to execution of the Agreement in accordance with MGL Chapter 30, Section 39R *Definitions; contract provisions; management and financial statements; enforcement.*

- A statement by management on internal accounting controls;
- A statement prepared by an independent certified public accountant regarding management's statement; and
- An audited financial statement for the most recent completed fiscal year.

D. General Bidder certifies that if awarded the Contract, any Work involving the removal, containment, or encapsulation of asbestos or material containing asbestos will only be performed by a licensed contractor in accordance with MGL Chapter 149, Section 6BA.

E. General Bidder will comply with all laws of the Commonwealth of Massachusetts relating to unemployment contributions and payments in lieu of contributions pursuant to MGL Chapter 151A, Section 19A, as amended.

## 1.04 General Bidder's Certifications and Representations Required by the EPA State Revolving Fund Program

A. *Department of Environmental Protection's Diesel Retrofit Program:* General Bidder certifies it has submitted a signed and dated Statement of Intent to Comply form included in Section 00 45 58 as part of its Bid and will comply with detailed requirements included in Section 00 73 10 for required certification after award.

B. *American Iron and Steel requirements of P.L. 113-76 (the Consolidated Appropriations Act of 2014)*: General Bidder acknowledges to and for the benefit of the Owner and the State that it understands the material and equipment, and services under any resulting Agreement are being funded with monies made available by the Drinking Water State Revolving Fund that have statutory requirements commonly known as "American Iron and Steel (AIS) Requirement" that requires all of the iron and steel products used in the Project to be produced in the United States including iron and steel products provided for the Project. General Bidder hereby represents and warrants to and for the benefit of the Owner and the State that (a) General Bidder has reviewed and understands the AIS Requirement, (b) all of the iron and steel products used in the Project will be produced in the United States in a manner that complies with the AIS Requirement, unless a waiver of the requirement is approved, and (c) General Bidder will provide any further verified information, certification or assurance of compliance with the AIS Requirement, or information necessary to support a waiver of the AIS Requirement, as may be requested by Owner. Guidance information is included in Section 00 73 10.

C. *EPA Disadvantaged Business Enterprise Program*: General Bidder certifies it will comply with the specific affirmative action steps contained in Equal Employment Opportunity/Affirmative Action provisions of the Contract including compliance with the Disadvantaged Business Enterprise provisions in Section 00 73 38, and if General Bidder is awarded a Contract, it shall incorporate these provisions into all subcontracts and Purchase Orders so that such provisions will be binding upon each Subcontractor or Supplier.

1. General Bidder certifies that if it is deemed one of the lowest Responsible and Eligible General Bidders, as notified by the Owner, it shall submit documents required by and in accordance with 00 45 57 by the close of business on the third business day after notification, and the documents submitted shall be a condition of the General Bid.

D. General Bidder certifies compliance with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled "Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons)" in accordance with the Supplementary Instructions to Bidders.

E. General Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work and further certifies that all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins Work and if General Bidder is awarded a Contract, shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.

F. General Bidder will comply with the requirements of the Equal Employment Opportunity, Anti-discrimination, and Affirmative Action Program provisions in the Contract Documents, and if General Bidder is awarded a Contract, it shall incorporate these provisions into all subcontracts and Purchase Orders so that such provisions will be binding upon each Subcontractor or Supplier.

| CERTIFIED BY GENERAL BIDDER ON: |
|---|
| By: |
| *Authorized person per Form for General Bid and Annex* |

**END OF SECTION**

# SECTION 00 01 10

# TABLE OF CONTENTS

**TOTAL PAGES**

**DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS (CONTINUED)**

**CONTRACTING REQUIREMENTS (CONTINUED)**

# SECTION 01 11 00

# SUMMARY OF WORK

## PART 1 – GENERAL

### 1.01 SECTION INCLUDES

A. Project Description

B. Description of the Work

C. Work Sequence and Coordination

D. Special Requirements

### 1.02 PROJECT DESCRIPTION

A. The Project is to upgrade equipment throughout the Millham Water Treatment Plant including but not limited to pumps, chemical feed systems, clarifiers, filters, HVAC, instrumentation, SCADA, electrical systems and security.

### 1.03 DESCRIPTION OF THE WORK

A. The Work includes labor, material and equipment, services required for construction, testing, and commissioning of the Project in accordance with the Contract Documents and as more specifically described in the Specifications and Drawings and includes, but is not limited to, the following principal features:

1. Install a new ultraviolet (UV) disinfection system in a stand-alone building adjacent to the water treatment plant.

2. Convert existing sodium aluminate feed system to bulk liquid caustic; convert sodium bicarbonate feed system to soda ash; ~~and, convert~~ alum feed system to PACl; and, the addition of a sodium permanganate feed system.

3. Replace Clarifier Blower No. ~~1~~2 and the blower intake silencer for Clarifier Blower No. 3.

4. Replace filter underdrain nozzles and regrout plates, replace filter media, replace filter influent valves and drain valves.

5. Replace spent backwash pump and add VFD.

6. Replace high lift pump no. 2 and add a VFD to pump no. 1.

7. Replace existing sump pumps and controls.

8. Upgrade HVAC system equipment in the Raw Water Pump Station, chemical storage room, fluoride room, chemical room and chlorine room.

9. Install instrumentation, SCADA, electrical and security upgrades.

B. Work Site locations: generally as shown on the Drawings.

C. Existing conditions and Site data: per the Drawings and Section 01 15 00.

## 1.04 WORK SEQUENCE AND COORDINATION

A. The Work will extend over multiple seasons and must be sequenced to limit impacts to the Millham Water Treatment Plant operations and adjacent areas from construction.

B. Access to businesses and residences must be maintained during prosecution of the Work.

C. The Millham Water Treatment Plant may be shut down for two scheduled periods during construction to complete portions of the work as described below. During the remainder of the construction period, except for very short durations, the plant must remain in operation. Shut downs shall be coordinated with the Owner, Engineer, and Plant Operations Staff a minimum of one week prior to the required shut down. All shut downs must be approved in writing by the Owner.

D. A plant shutdown shall be conducted prior to starting work on the UV building. The duration of the shutdown shall be a maximum of 14 calendar days. The following work shall be performed during this shut down:

1. Excavation of the test pit, determination of the size of the existing thrust block, and enlargement of the existing thrust block on the plant's 16-inch finish water main as indicated on the Drawings.

2. Installation of the 18-inch tees and gate valves on the existing 18-inch clearwell effluent pipe. Installation of temporary plugs on the new valves leading to the UV system. Provide temporary restraint for the temporary plugs. The clearwell will be drained to approximately the level of the bottom of the existing pipes (EL. 241.92) between the exterior clearwell and the treatment plant building by the Plant Operators. This work shall be coordinated with the Plant Operations Staff a minimum of one week in advance. Any remaining water in the exterior clearwell that needs to be drained will have to be pumped by the Contractor.

3. Installation of the power monitoring instruments in the Main Switchboard. The power monitor can be installed in the main electric room along with all wires and conduits run between the Switchboard/SCADA panel and the wall mounted power monitor device.

| ITEM OC1: Owner's Contingency for Additional Thrust Restraint<br>ITEM OC2: Owner's Contingency for Additional Chemical Feed System Work<br>ITEM OC3: Owner's Contingency for Additional Filter Rehabilitation Work | |
|---|---|
| **Measurement** | Portion of Owner's contingency allowance amount authorized per Paragraph 11.02 of the General Conditions and Supplementary Conditions |
| **Payment** | Percent of not to exceed contingency amount authorized. |
| **Schedule of Payment** | Monthly based on progress |
| Owner's contingency for Additional Thrust Restraint and Additional Work for the Chemical Feed System and Filter Rehabilitation, as requested by Owner, recommended by Engineer, and approved by Owner in a Change Order. Contractor shall not receive payment for any unused portion of the contingency allowance. | |

| **ITEM U1: Unit Priced Item-~~C~~ Filter Underdrain Grout Joint Replacement** | |
|---|---|
| **Measurement** | As measured by the Engineer. |
| **Payment** | Per linear foot of joint as stated in the Bid Form. |
| **Schedule of Payment** | Monthly based on progress. |
| Material and equipment, services, installation, construction and testing inherent to grouting the filter underdrain as shown on the Drawings and as specified. | |

| **ITEM U2: Unit Priced Item- Rock Removal** | |
|---|---|
| **Measurement** | As measured by the Engineer. |
| **Payment** | Per cubic yard as stated in the Bid Form. |
| **Schedule of Payment** | Monthly based on progress. |
| Material and equipment, services, installation, construction and testing inherent to rock removal as shown on the Drawings and as specified. | |

| ITEM S1 through S5: Filed Sub-Bids | |
|---|---|
| **Measurement** | Determine value of Work completed to date based on submitted Schedule of Values. |
| **Payment** | Percent of lump sum price based on Schedule of Values. |
| **Schedule of Payment** | Monthly based on progress. |
| Material and equipment, services, installation, construction and testing inherent to Sub-Bid Work as part of the Millham WTP Upgrades as shown on the Drawings and as specified. | |

**PART 2 - PRODUCTS (not used)**

**PART 3 – EXECUTION (not used)**

**END OF SECTION**

# SECTION 31 00 00

# EARTHWORK

## PART 1 – GENERAL

### 1.01 SUMMARY

A. Section Includes

1. Provide excavating, filling, backfilling, stockpiling, bedding, compacting, grading, protection, installation and removal of support of excavation and other Work necessary for the construction of pipelines, conduits, structures, pavements, and appurtenant Work in accordance with this Section, the Drawings and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. 31 10 00 Site Clearing

2. 31 25 00 Erosion Controls

### 1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

### 1.03 REFERENCES

A. Reference Standards

1. MassDOT Standard Specifications and Supplements, except for Compensation sections

2. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

3. ASTM D6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

### 1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

C. Sample Test Reports and Evaluations

1. Materials gradations

2. Backfill moisture-density relationships

D. Temporary Excavation Support Design

~~D.~~E. Source and Field Quality Control Submittals

~~E.~~F. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

## 1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Waste Management and Disposal

1. Legally dispose of excess or unsuitable material at no additional cost to Owner.

## 1.08 SITE CONDITIONS

1. Existing Conditions: per Division 01 General Requirements.

# PART 2 – PRODUCTS

## 2.01 MATERIALS

A. ~~Pipe and~~ Structure Bedding: 3/4 inch sized crushed stone; durable, clean angular rock fragments obtained by breaking and crushing rock material meeting the criteria of the M2.01.4 of the MassDOT Standard Specifications and Supplements for bedding ~~beneath pipe and~~ structures~~, to 6 inches above the crown of the pipe~~:

Sieve analysis by weight:

| Sieve Size (inches) | Percent Passing by Weight |
|---|---|
| 1 | 100 |
| 3/4 | 95-100 |
| 1/2 | 35- 70 |
| 3/8 | 0- 25 |

B. Suitable Backfill: well-graded granular material, of which at least 25 percent by weight shall be retained on the #40 sieve and contain less than 35 percent finer than a #200 sieve by weight, predominantly free from organic matter, man-made materials, ice, snow or other deleterious material and have characteristics so it can be readily placed and compacted. Place ~~6~~ 12 inches above the crown of the pipe and around structures 6 inches above the crown of the highest pipe and up to the underside of the pavement section.

C. Structural Fill: gravel material, for structure backfill per M1.03.1 Type b of the MassDOT Standard Specifications and Supplements, consisting of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials having suitable moisture content to allow for proper compaction as specified in Paragraph 3.08 of this Section. Unsuitable structural fill: soil that is too wet for proper compaction.

Gradation:

| Sieve Size | Percent Passing by Weight |
|---|---|
| 3 inch | 100 |
| 1/2 inch | 50 - 85 |
| #4 | 40 - 75 |
| #50 | 8 - 28 |
| #200 | 0- 10 |

D. Gravel Borrow (Processed Gravel): processed gravel for backfill per M1.03.1 of the MassDOT Standard Specifications and Supplements, consisting of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. Coarse aggregate percentage of wear: not more than 50 by the Los Angeles Abrasion Test.

Gradation:

| Sieve Size | Percent Passing by Weight |
|---|---|
| 3 inch | 100 |
| 1-1/2 inch | 70-100 |
| 3/4 inch | 50-85 |
| #4 | 30-60 |
| #200 | 0-10 |

E. Sand: Sieve analysis by weight:

| Sieve Size | Percent Passing by Weight |
|---|---|
| 3/8-inch | 100 |
| #4 | 95-100 |
| #16 | 50-85 |
| #100 | 2-10 |

F. 3/4 Inch Crushed Stone: Durable crushed rock or crushed gravel stone; crushed stone per M2.01.4 of the MassDOT Standard Specifications and Supplements, free of ice, snow, sand, silt, clay, loam, shale, or other deleterious matter; graded within the following limits:

| Sieve Size | Percent Passing by Weight |
|---|---|
| 1 inch | 100 |
| 3/4 inch | 90 - 100 |
| 1/2 inch | 10 - 50 |
| 3/8 inch | 0 - 20 |
| #4 | 0 - 5 |

G. Drainage Stone: 1-1/2" crushed stone per M2.01.1 of the MassDOT Standard Specifications and Supplements consisting of durable, clean angular rock fragments obtained by breaking and crushing rock material:

| Sieve Size | Percent Passing by Weight |
|---|---|
| 2 inch | 100 |
| 1-1/2 inch | 95 - 100 |
| 1 inch | 35 - 70 |
| 3/4 inch | 0 - 25 |

H. Controlled Density Fill (CDF) (Flowable Fill): excavatable and used to limit settlement, lateral movement, undermining, washout and other hazards created by earthwork operation as shown on the Drawings and when excavating around structures, utilities, sidewalks, pavements, and other facilities. Batch CDF at concrete plant.

1. Portland Cement: AASHTO M85.

2. Fly Ash: AASHTO M4.05.02.

3. Sand: M4.02.02 of MassDOT Standard Specifications and Supplements.

4. Water: M4.02.04 of MassDOT Standard Specifications and Supplements.

5. Air Entraining Admixture: M4.02.05 of MassDOT Standard Specifications and Supplements.

6. Compressive Strength: 28 day = 30-80 psi, 90 day = 100 psi

7. Slump: 10 - 12 inches

I. Unsuitable materials: material containing excessive clay, vegetation, organic matter, debris, pavement, stones or boulders over 6-inches in greatest dimension, and frozen material and will not provide a suitable foundation or structural support for the pipe or material unsuitable for use in backfill.

J. Geotextile Fabric: Propex Geotex NW-801, Skaps GT-180, Tencate Mirafi 180N, or equal for use as separator between stone fill and existing soils.

## 2.02 SHORING AND BRACING MATERIALS

A. Provide suitable shoring and bracing materials to support loads imposed. Materials may be used and in serviceable condition and are subject to inspection ~~and approval~~ of the Engineer once delivered to the Site

## 2.03 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements. **EXECUTION**

## 3.01 EXAMINATION

A. Verification of Conditions

1. Before starting Work, check and verify governing dimensions and elevations. Survey condition of adjoining properties with Engineer. Take digital video recording any prior settlement or cracking of structures, pavements and other improvements. Prepare a list of such damages, verified by and signed by Contractor, Engineer, and others conducting the investigation.

2. Coordinate survey. Establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations. Locate datum level used to establish benchmark elevations sufficiently distant so as not to be affected by excavation operations.

3. Perform Test Pits before starting the Work;

a. At the 16-inch water line to expose the fitting and thrust block.

~~a.~~b. At the southerly edge of the Existing Clearwell to determine location of clearwell structure.

## 3.02 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Site/Field Tests and Inspections

1. During excavation, resurvey benchmarks weekly, employing licensed Land Surveyor or registered Professional Engineer. Maintain accurate log of surveyed elevations for comparison with original elevations. Notify Engineer if changes in elevations occur or if cracks, sags or other damage is evident.

## 3.03 EXCAVATION

A. Remove materials encountered to the limits shown on the Drawings, designated in the Specifications or as required by the Owner.

1. Do not perform excavation below normal grade to remove and replace unsuitable materials until approved by the Engineer.

2. Do not perform excavation of rock, boulder or unsuitable materials until material to be excavated has been cross-sectioned and classified by Engineer.

B. Earth Excavation: removal and disposal of pavements, curbing and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, and other materials encountered that are not classified as rock excavation or unauthorized excavation. Legally dispose of surplus materials resulting from excavation and not needed for use on the Project, as determined by the Engineer. Obtain necessary permits legal disposal of surplus material.

C. Excavation in Asphalt Pavement Areas

1. Saw cut or mill to full depth through existing pavement prior to any excavation for pipe or structure placement. Minimize disturbance of remaining pavement. Cut and remove the minimum amount of pavement required to do the Work.

2. Use shoring and bracing where sides of excavation will not stand without undermining pavement.

3. Keep material and soil stockpiles a minimum 10 feet back from the edge of excavation, or in accordance with the approved support of excavation design, to avoid overloading of the sides of excavation and prevent slides or cave-ins.

4. Remove and dispose of existing pavements in the course of the Work. Take care to avoid mixing existing pavement material with excavation material to be used for backfill.

D. Excavation for Trenches

1. Excavate to widths shown on the Drawings.

2. Produce an evenly graded flat trench bottom at the subgrade elevation required for installation of pipe and bedding material.

3. Load excavated material directly into trucks unless otherwise permitted by the Engineer.

4. Place backfill material directly into trench or excavation. Do not stockpile material to be used as backfill in traffic areas.

E. Unauthorized Excavation: removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer. Unauthorized excavation, as well as remedial Work directed by Engineer including refilling, is at no additional cost to Owner.

1. Refilling Unauthorized Excavation

a. Trenches: Use 3/4-inch crushed stone and stabilization fabric as a separator material, if necessary, as directed by Engineer.

b. Elsewhere: Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer.

F. Excavation Below Normal Grade: When excavation has reached required subgrade elevations, notify Engineer who will make an inspection of conditions. If unsuitable bearing materials, as defined in Paragraph 2.01 above, are encountered at required subgrade elevations, carry excavations deeper as directed by Engineer and replace excavated material with crushed stone or as directed by the Engineer.

G. Excavation Above Normal Grade: If unsuitable materials, as defined in Paragraph 2.01 above, are encountered above normal grade, remove the unsuitable material and dispose of and do not use as backfill on any portion of the Project, unless otherwise approved by the Engineer. Use suitable stockpiled material approved by the Engineer, to replace the unsuitable material to backfill the trench to the dimensions for pipe and structure bedding and backfill as shown on the Drawings. If suitable stockpile material is not sufficient to backfill the trench to required dimensions, use gravel borrow to complete the trench backfill to the elevation shown for pipe and structure backfill. Furnish and install stockpiled material and gravel borrow at no additional cost to Owner.

H. Material Storage

1. Stockpile and maintain suitable surplus excavated materials for re-use as backfill anywhere within the Project limits as directed by the Engineer. Place, grade, and shape stockpiles for proper drainage. Cover stockpiles when unused to limit infiltration by precipitation.

2. Provide erosion controls around stockpile areas as required by the local Conservation Agent and/or the Engineer at no additional cost to Owner.

3. Locate and retain soil materials at least 10 feet away from edge of excavations or as allowed approved support of excavation design.

I. Field Quality Control

1. Provide in accordance with Division 01 General Requirements.

## 3.04 ROCK REMOVAL

A. General

1. Rock Excavation shall be understood to mean bedrock which cannot be removed by conventional excavation and requires ripping by power tools. Notify Engineer immediately of change in classification. Should bedrock be encountered above the trench bottom grade or above the subgrade elevation, expose the bedrock surface and to allow the Engineer to perform the necessary elevation survey and take cross-sectional measurements for payment.

2. Boulders, rock fragments and concrete less than one cubic yard in size are considered as part of conventional excavation and are not considered for payment as Rock.

~~2.~~3. Perform Rock Excavation by mechanical methods.

~~3.~~4. Boulders: Remove or partially remove boulders exposed on the sides of or in the bottom of excavations as directed by the Engineer. Remove boulders to not less than 2 feet outside structure walls, not less than 12 inches outside footings, not less than 6 inches below underslab subgrade, not less than the lateral trench width payment lines indicated, and not less than 12 inches below the underside of pipes. Depressions resulting from the removal of boulders and rock shall be refilled with approved compacted bedding. Bedding for refilling will not be paid for separately.

~~4.~~5. Refill unauthorized rock excavations, or excavations made beyond or below the indicated or directed excavation pay limits, with compacted bedding at no additional cost.

~~5.~~6. Remove and dispose of unused rock and boulders off-site.

## 3.05 SHORING AND BRACING

A. General

1. Provide temporary sheeting, shoring, and bracing in locations where required to protect excavated areas and adjacent structures as required for safety or compliance with OSHA and Laws and Regulations per Section 00 73 19, at no additional cost to the Owner. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, additional supports may be ordered to be placed at no additional cost to the Owner. Compliance with such order shall not relieve the Contractor from responsibility for the sufficiency of such supports.

2. Excavation of the UV Building shall be conducted to protect the adjacent Existing Clearwells. Open excavation adjacent to the Existing Clearwell will not be permitted. Contractor shall verify the location of the buried clearwell structure before excavation and shoring.

~~2.~~3. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in Laws and Regulations per Section 00 73 19. Shoring and bracing shall ~~As a minimum,~~ follow the current OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926.

~~3.~~4. Provide system to resist earth and hydrostatic pressures, including surcharges from surface loads.

~~4.~~5. Maintain shoring and bracing while excavation is open.

~~5.~~6. If not leaving in place, remove systems in stages to prevent disturbance of soils and damage to structures and improvements. Fill voids as soon as sheeting is withdrawn.

B. Provide shoring and bracing designed and stamped by a Massachusetts Registered Professional Engineer regularly engaged in similar work with a minimum of ten (10) years experienced in the design of temporary excavation supports to protect existing buildings, utilities, and other improvements and excavation against movement due to caving and to meet safety requirements of OSHA and Laws and Regulations per Section 00 73 19 for shoring and bracing. Review will be submitted for information only. The Contractor shall be solely responsible for the adequacy and safety of the of the temporary excavation support.

1. Wood Sheeting and Bracing: used as needed to make excavation safe and secure. Leave wood sheeting in place.

2. Steel Sheet Piling: to be removed following completion of Work or remain in place when directed by the Engineer. Drive sheet piling prior to excavation where possible. Fill and compact voids outside sheeting to hold sides of excavation in place.

   Steel sheet piling may be left in place at the Contractor's option if approved by the Engineer and at no additional cost to the Owner. Cut off sheet piling to be left in place at least 5 feet below finish grade or less if directed by the Engineer.

3. Movable box: used where a shoring system is required but steel piling is not called for as determined by Contractor as not all areas of Work will be conducive to the use of a movable box.

C. Field Quality Control

1. Provide in accordance with Division 01 General Requirements.

## 3.06 DEWATERING

A. Provide in accordance with Division 01 General Requirements.

## 3.07 BACKFILL AND FILL

A. Do not backfill excavations and trenches until new utilities have been inspected and, if required, tested satisfactorily for conformance with the Drawings and Specifications unless directed otherwise by the Engineer. Place acceptable soil material in layers to required elevations as shown on the Drawings or as specified. Fill, backfill, and compact in accordance with this Section to produce minimum subsequent settlement of the material and provide adequate support for the surface treatment or structure to be placed on the material. Place material in approximately horizontal layers beginning at lowest area to be filled. Do not impair drainage. Replace fill that becomes frozen or saturated in stockpiles with suitable off-Site fill at no additional cost to Owner.

B. Ground Surface Preparation

1. Remove asphalt and concrete pavements, granular base course, existing sandy and gravelly fills, existing organic silty/clay soils, organic peat, vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface to excavation subgrade prior to placement of fills. Scarify surfaces so that fill material will bond with existing surface.

2. When existing ground surface has a density less than that specified under Article 3.07, Compaction, for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

C. Placement

1. Place backfill and fill materials in layers not more than 6 inches in loose depth for material compacted by heavy compaction equipment or hand-operated tampers. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.

3. Do not allow heavy machinery within 5 feet of structure during backfilling and compacting.

D. Backfilling Excavations

1. Backfill excavations promptly as Work permits, but not until completion of the following:

   a. Inspection and recording locations of underground utilities

   b. Removal of concrete formwork

   c. Removal of shoring and bracing, and backfilling of voids with satisfactory materials

   d. Removal of trash and debris

2. Use care in backfilling to avoid damage or displacement of underground structures and pipe.

3. Backfill under existing utility pipes crossed by new utility pipes with CDF. The CDF will extend continuously from the bedding of the new pipe to the utility pipe crossed, including a 6-inch thick envelope of CDF around the existing utility pipes.

4. Backfill with CDF when clearance between proposed structure and existing structure is 18 inches or less and sufficient clearance is not provided to obtain suitable compaction, in the opinion of the Engineer.

5. Backfill with CDF for trenches within impervious surfaces with pipes containing less than 3 feet of cover.

6. Provide that 3/4 inch crushed stone backfill stands at its own angle of repose. "Haunching" or "forming" with common fill is not allowed.

E. Backfilling Trenches

1. See Trench Detail on the Drawings.

2. Place pipe and structure bedding and gravel bedding to the extent and dimensions shown on the Drawings so that the pipes and structures have complete and uniform bearing.

3. Grade, compact and shape pipe and structure bedding so that the full length of pipe barrel has complete and uniform bearing. Dig bell holes and depressions for joints after the bedding has been graded and compacted, at proper clearance for jointing the pipes.

4. Following inspection and approval of pipe installation by Engineer, carefully hand place and properly compact additional approved bedding to

the limits shown on the Drawings. Hand or mechanical tamping on the sides of the pipe.

5. Place ~~6 inches of~~ suitable backfill in trenches above the ~~crown of pipe~~compacted sand blanket as approved, not frozen and without stones larger than 3 inches in the greatest dimension. ~~Spread in layers not exceeding 6 inches in loose thickness and compact each layer by at least 4 passes with an approved vibratory compactor.~~ See Article 3.~~07~~ 08 for compaction types and standards. Carefully place trench backfilling to avoid disturbance of new Work and of existing structures. Adjust moisture content of backfill to allow for proper compaction.

6. Bed pipe in pipe and structure bedding (3/4-inch crushed stone except where otherwise indicated. Limits of bedding and requirements for remaining trench backfill are shown on the Drawings.

7. Trenches in cross-country runs: Restore surface to that existing prior to construction, as shown on the Drawings, or required by the Engineer. Mound trench 6 inches above existing grade or as required by the Engineer.

F. Field Quality Control

1. Provide in accordance with Division 01 General Requirements.

## 3.08 COMPACTION

A. Use methods which produce the required degree of compaction throughout the entire depth of material placed without damage to new or existing facilities and which are approved by the Engineer. Adjust moisture content of soil as required. Remove and replace material which is too wet to compact to required density. Compact each layer as Work progresses.

# SECTION 32 31 13
# CHAIN LINK FENCING AND GATES

## PART 1 – GENERAL

### 1.01 SUMMARY

A. Section Includes

1. Provide 8' fabric height chain link fence, with pedestrian swing gate and motorized horizontal sliding vehicle gate as shown on Drawings

2. Provide motorized gate opener with loop detectors and keypad station access control.

3. Provide Knox-Box near access control station for the Fire Department.

   a. The Owner has determined that specifying proprietary control equipment for the Project is in the public's best interest. The Owner has standardized on the Knox Box emergency access security box since it is approved by public safety departments.

4. Provide signs as specified in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 31 00 00 – Earthwork

2. Section 03 30 00 – Cast-in-Place Concrete

### 1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

### 1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM A121 Specification for Metallic-Coated Carbon Steel Barbed Wire

2. ASTM A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric

3. ASTM A491 Specification for Aluminum-Coated Steel Chain-Link Fabric

4. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot- Dip Galvanized Coatings

5. ASTM A824 Specification for Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link

6. ASTM F552 Standard Terminology Relating to Chain Link Fencing

7. ASTM F567 Standard Practice for Installation of Chain Link Fence

8. ASTM F626 Specification for Fence Fittings

9. ASTM F900 Specification for Industrial and Commercial Swing Gates

10. ASTM F1043 Specification for Strength and Protective Coatings of Metal Industrial Chain Link Fence Framework

11. ASTM F1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

12. ASTM F1184 Specification for Industrial and Commercial Horizontal Slide Gates

13. ASTM F1345 Specification for Zinc-5% Aluminum-Mischmetal Alloy-Coated Steel

14. ASTM F2200 Specification for Automated Vehicular Gate Construction

B. Chain-Link Fence FabricUnderwriters Laboratories (UL)

1. UL 325, Class III - Industrial /Limited Access Vehicular Gate Operator

C. American Welding Society

1. AWS D1.2 Structural Welding Code. See 2.01 D and 2.03 D.

## 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

B. Installation of the chain link fencing and motorized gate to occur after the UV-disinfection building is erected.

## 1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

1. Product data on fabric, posts, and accessories.

2. Product data for horizontal sliding gate and gate opener.

3. Installation instructions for metal fencing and gates.

# SECTION 40 94 43

# PROGRAMMABLE LOGIC CONTROLLERS

## PART 1 – GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall provide all labor, materials, equipment and appurtenances to furnish and install the programmable logic controllers and operator interface terminals as specified herein and on the Drawings. This Section covers the following:

1. Programmable Logic Controllers (PLC)

   a. The Owner has determined that specifying proprietary control equipment for the Project is in the public's best interest. The Owner would like to standardize on Allen Bradley Programmable Logic Controller due to reliability and compatibility of replacement parts.

2. Operator Interface Terminals (OIT)

B. Definitions

1. PLC: Programmable Logic Controller

2. RIO: Remote Input/Output Rack

3. OIT: Operator Interface Terminal

4. HMI: Human Machine Interface

5. RTU: Remote Terminal Unit

6. I/O: Input Output

7. SCADA: Supervisory Control and Data Acquisition

### 1.02 WORK NOT INCLUDED

A. Programming of the existing plant PLC, HMI, the new filter room OIT and the new UV building PLC shall be by others. UV Vendor system programming is by the manufacturer.

### 1.03 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary General Conditions and other Specification Sections, which apply to the Work of this Section.

## 1.04 QUALITY ASSURANCE

A. PLCs and OITs provided under this Contract shall comply with the Specifications, shall be supplied from manufacturers regularly engaged in the production of such products, shall be standard products (not special order or custom-made) wherever possible, and shall be of the manufacturer's latest design.

B. This specification has been developed to establish minimum requirements for the solid-state programmable controllers and OITs designed to provide high reliability in industrial applications. All PLCs, OITs, and associated software provided under this Contract shall meet the requirements of this Specification, unless approved by the Engineer. If production of equipment is discontinued, the Contractor shall submit an alternate of comparable quality to the Engineer for approval prior to execution of Work, and at no additional cost to Owner.

## 1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

## 1.06 DELIVERY, STORAGE, AND HANDLING

A. Coordinate equipment, instrument, and material delivery to coincide with the Project schedule. If the delivery schedule of any equipment, instrument, or material shall affect the overall Project schedule, notify the Engineer in writing immediately. Include in the written notification documentation from the equipment Supplier indicating the revised delivery schedule and reason for the change.

B. When applicable, coordinate delivery equipment, instruments, or materials to be delivered directly to another trade or vendor for installation in a system or control panel provided under another Specification Section.

C. Exercise care while loading, unloading and transporting equipment, instruments and materials to avoid damage. Check all equipment, instruments, and materials for damage or defects within seven (7) days of delivery to the Project Site.

D. Equipment, instruments, and materials required to be stored on Site prior to installation shall be stored in such a manner to avoid damage or exposure to water, dust, or construction debris.

E. Repair or replace, at no additional cost to the Owner, all equipment, instruments and materials that are defective or damaged during installation, to the satisfaction of the Engineer.

F. Provide in accordance with Division 01 General Requirements.

# SECTION 46 33 00

# WATER TREATMENT CHEMICAL FEED EQUIPMENT

## PART 1 – GENERAL

### 1.01 SUMMARY

A. Provide chemical feed equipment including all pumps, tanks, and appurtenances as shown on the Drawings and as specified herein and/or are required to complete the work outlined in the Contract Documents. All chemical feed equipment shall be of sizes and connection types as shown on the Drawings as well as that specified herein. Below is a summary of the major components of the chemical feed equipment to be provided.

1. Sodium Hydroxide (Caustic) Feed System
    a. One (1) transfer pump and control panel
    b. One (1) day tank
    c. Three (3) metering pumps and control panels
    d. Piping, valves, and appurtenances
2. Aluminum Sulfate (Alum) Feed System
    a. One (1) transfer pump and control panel
    b. One (1) day tank
    c. Two (2) metering pumps and control panels
    d. Piping, valves, and appurtenances
3. Sodium Carbonate (Soda Ash) Feed System
    a. Two (2) dry feed systems
    b. Three (3) metering pumps and control panels
    c. Piping, valves, and appurtenances
4. Sodium Permanganate (Permanganate) Feed System
    a. One (1) bulk tank and bulk feed station
    b. One (1) transfer pump and control panel
    c. One (1) day tank
    d. Two (2) metering pumps and control panels
    e. Piping, valves, and appurtenances

B. Related Requirements

1. 40 05 13 – Process Pipe & Fittings
2. 40 05 23 – Process Valves & Strainers
3. 40 05 15 – Process Pipe Supports
4. 40 50 17 – Process Pipe Sleeves & Seals
5. Division ~~16~~ 26 – Electrical
6. 40 90 00 – Instrumentation and Control for Process Systems
7. 40 91 00 – Primary Process Measurement Devices

## 1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

## 1.03 REFERENCES

A. Reference Standards

1. MassDEP Guidelines for Public Water Systems Chapter 6: Chemical Application
2. API STD 675 Positive Displacement Pumps-Controlled Volume (most up-to-date edition)
3. NFPA 70 – US National Electrical Code
4. NEMA ICS 3.1 – Safety standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.
5. NEMA 250 – Enclosures for Electrical Equipment
6. UL 508A – Underwriter's Laboratory Industrial Control Equipment
7. UL 508C – Underwriter's Laboratory Power Conversion Equipment
8. IEC 146 – International Electrical Code.
9. NSF – National Sanitation Foundation
10. IEC 146 – International Electric Code
11. ISO 9001 – Quality Management Systems Requirement
12. ISO 14001 – Environmental Management Systems Requirements

# SECTION 46 41 17

# INLINE STATIC MIXERS

## PART 1 – GENERAL

### 1.01 SUMMARY

A. Section Includes

1. Provide the inline static mixers as shown on the Drawings, herein specified, as necessary for proper and complete performance and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 40 05 13 – Process Pipes & Fittings

### 1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

### 1.03 REFERENCES

A. Reference Standards

1. ASTM D 1784 Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

2. ASTM D 2467 Schedule 80 PVC Fittings

3. ASME B16.1, Class 125 for all PVC Flange Dimensions

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

### 1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Manufacturer's literature, illustrations, specifications and engineering data including dimensions, materials, and weight.

C. Design Data/Submittals

1. Calibrated chart showing relationship between flow and pressure drop for the diameter mixers.

2. Documentation of compliance with NSF Standard 61.

3. Material of construction with ASTM reference and grade. Submit Manufacturer's certificates of compliance with referenced standards.

D. Sample Test Reports and Evaluations

1. Certified mixer shop test reports

E. Manufacturer Instructions

1. List of manufacturer-recommended spare parts

F. Source and Field Quality Control Submittals

1. Furnish a report verifying complete mixing (98%), within a standard deviation of 15%, capability at flow rates ranging from 500 gpm to 2500 gpm (Water Treatment Plant).

G. Manufacturer Reports

1. Written certification of proper installation of motionless mixers.

H. Qualification Statements

1. The mixer manufacturer shall furnish proof of a minimum of 10 installations comparable to that specified which have been successfully operating for the last five years.

I. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

## 1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Pre-Construction Testing

1. Mixers shall not be shipped until the Engineer has approved the certified mixer shop test reports.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

## 1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

## 1.09 MAINTENANCE

A. Extra Materials: Furnish as specified below. Make interchangeable with and same material and workmanship as corresponding original parts.

# PART 2 – PRODUCTS

## 2.01 INLINE STATIC MIXER

A. Inline Static Mixer Design Criteria:

1. Mixer shall provide uniform mixing of dilute aqueous solutions of sodium hydroxide, sodium carbonate, and ammonia, and phosphate into the main water stream at flow rates ranging from 0.7 to 3.6 MGD with a pressure drop of less than 2.1 psi maximum though its 16 inch NPS diameter housing.

2. Mixer shall be fabricated in Schedule STD Standard carbon steel.

3. Internal surfaces of mixer shall be coated with NSF 61 approved Tnemec Pota Pox Plus series 140 epoxy paint @ 6-8 mils DFT each coat.

4. Exterior of mixer to be coated with one coat of rust inhibitive red oxide primer.

5. Mixer housing ends shall be 150# RFSO Carbon Steel Flanges.

6. Each mixer shall be of the high performance HEV type and include a minimum of three (3) stages of mixing elements, to provide equal dispersion of all chemicals in the flow stream.

7. Mixing element should be a triple-action mixing design producing two-by-two division, cross current mixing and counter rotating vortices shall be provided which produce a high degree of back mixing at the designed flow rates with minimum pressure drop. Mixing elements should be welded in mixer spool.

8. Trapezoidal tab type mixing elements shall not be accepted. Mixing elements configured as corrugated metal plates shall not be accepted. Helical, double action mixing elements shall not be accepted.

9. Mixer overall length shall not exceed 60 inches.

10. Housing and Elements Materials: The housing and elements shall be constructed of 316L stainless steel, conforming to or exceeding the requirements of the latest ASTM Standards.

11. The inline static mixers shall be suitable for attachment to 16-inch diameter flanged ductile iron pipe, as indicated on the Drawings.

A. Model

1. Komax Model #66169

2. Koflo model 16-DI-13-v4.4(3)-13

3. or equal

## 2.02 ASSEMBLY OR FABRICATION

A. The exterior surface shall have a smooth, chemically resistant texture.

B. The interior surface shall be resistant to sodium hypochlorite, sodium hydroxide, ammonia, sodium carbonate, fluoride, and phosphate.

C. Slippage of an element housing assembly into a pipeline, or the use of retaining bars at mixer discharge will not be acceptable.

D. The mixing element tabs shall be permanently mounted on the interior of the mixer pipe.

## 2.03 ACCESSORIES

A. Extra Supplies

1. Manufacturer-recommended spare parts.

## 2.04 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Tests and Inspections

1. Mixers shall be hydrostatically tested to 1.5 times the maximum operating pressure, and held at that pressure for at least 15 minutes.

2. A shop pressure drop test shall show a pressure drop within 10 percent of the calculated values.

3. Each test shall be witnessed by a Registered Professional Engineer, who may be an employee of the manufacturer. He shall certify that hydrostatic tests were performed and shall sign and seal all copies of all test results.

One week notice of the tests shall be sent to the Engineer so that a representative of the Owner may witness the tests.

4. If the results of the shop tests indicate that a mixer fails to meet the performance requirements for pressure drop, it shall be modified to meet the requirements or replaced at no additional cost to the Owner.

5. Mixers shall not be shipped until the Engineer has approved the certified mixer shop test reports.

## PART 3 – EXECUTION

### 3.01 EXAMINATION

A. Verification of Conditions

### 3.02 INSTALLATION

A. Installation of the static mixers shall be in complete accordance with manufacturer's instructions.

B. The Contractor shall provide supports as required by the mixer manufacturer.

C. The Contractor shall make all adjustments required to place the mixers in proper operation.

### 3.03 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Manufacturer Field Services

1. The manufacturer's representative shall check and approve the installation before operation of the system.

2. Upon completion of the installation of the static mixers, a manufacturer's representative shall be available for a minimum of one day of service for certifying proper installation and instructing the Owner's operating personnel on the operation and maintenance of the mixers. The Owner reserves the right to video tape the instruction of the operating personnel.

C. Site/Field Tests and Inspections

1. Upon completion of the installation, the system shall be examined for leaks. All leaks should be corrected prior to start-up.

### 3.04 STARTUP & COMMISSIONING

A. Provide in accordance with Division 01 General Requirements.

B. Disinfection

1. Disinfect new equipment in accordance with the latest revision of AWWA C-653. Prevent contaminated or highly chlorinated water from entering new or previously disinfected equipment.

## 3.05 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

**END OF SECTION**

# SECTION 46 43 00

# CLARIFIER EQUIPMENT

## PART 1 – GENERAL

### 1.01 SUMMARY

A. Provide all labor, materials, equipment, and incidentals to furnish, install, startup, and test one rotary positive displacement blower, one blower intake silencer and necessary accessories as shown on the Drawings and specified herein.

1. The Owner has determined that specifying proprietary control equipment for the Project is in the public's best interest. The Owner would like to standardize on the Roots Model 36 URAI positive displacement blower and the Stoddard D13-2 blower intake silencer equipment due to reliability and compatibility of replacement parts.

B. Related Requirements:

1. 40 00 00 – Basic Process Materials and Methods
2. 40 05 13 – Process Pipe & Fittings
3. 40 05 14 – Process Pipe Couplings & Connectors
4. 40 05 17 – Process Pipe Sleeves & Seals
5. 40 90 00 – Instrumentation and Control for Process Systems

### 1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

### 1.03 REFERENCES

A. Reference Standards

1. American National Standards Institute (ANSI)
2. American Society for Testing Materials (ASTM)
3. Institute of Electrical and Electronic Engineers (IEEE)
4. National Electric Code (NEC)
5. Standards of the National Electrical Manufacturers Association (NEMA)

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

## 1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Complete list of all items to be provided including supplier and delivery schedule.

2. Manufacturer's Specifications and product data required to demonstrate compliance with requirements which shall include complete parts listing showing materials of construction with applicable HI, ANSI, ASTM and other standards.

3. The weight of each major component and the total weight of the equipment.

4. Installation manual including storage, transportation, leveling, alignment, wiring, pre-start, checklist, and initial startup procedures.

5. Location of nearest parts distributer. Location of nearest service center if different from parts distributer and if all parts are not field replaceable.

6. A list of the manufacturer’s recommended spare parts including but not limited to belts, filter elements, and a rebuild kit.

C. Certificates

1. Submit warranty statement.

D. Sample Test Reports and Evaluations

1. Certified factory tests and performance curves, as appropriate (e.g., pumps, blowers, and compressors).

E. Manufacturer Instructions

1. Manufacturer's recommended shipping, unloading, storage, installation, testing, operation and maintenance procedures including a list of special tools and equipment required to maintain the units.

F. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

## 1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

# SECTION 46 61 00

# FILTRATION EQUIPMENT

## PART 1 – GENERAL

### 1.01 SUMMARY

A. Provide filter underdrain nozzles, regrouting of filter underdrain panels, and filter media in accordance with this Section and applicable reference standards listed in Article 1.03.

1. The Owner has determined that specifying proprietary control equipment for the Project is in the public's best interest. The Owner would like to standardize on D-20 nozzles by Infilco Degremont, Inc. and gaskets by Infilco Degremont, Inc. to ensure compatible parts for proper operation of the filtration system.

### 1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

### 1.03 REFERENCES

A. Reference Standards

1. AWWA B604 Standard for Granular Activated Carbon

2. NSF/ANSI Standard 61

3. CRD C-621 (US Army Corp of Engineers) Specification for Non-Shrink Grout

4. ASTM C-1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

### 1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Complete materials list of all items to be provided including manufacturer, supplier and delivery schedule.

2. All exceptions and proposed revisions to the requirements of the Specifications shall be included with the Submittals.

3. Manufacturer's specifications and product data required to demonstrate compliance with requirements of the specifications.

C. Manufacturer Instructions

1. Manufacturer's recommended storage, installation, testing, operation and maintenance procedures including a list of special tools and equipment required to maintain the units.

D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

## 1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Packing, Shipping, Handling, and Unloading

1. All parts shall be packed in containers bearing labels clearly designating contents and pieces of equipment for which they are intended.

C. Storage and Protection

1. Contractor shall store all equipment delivered to the site in accordance with manufacturer's instruction.

D. Waste Management and Disposal

1. Dispose of previous filter media in accordance with manufacturer's recommendations as well as all federal, state, and local regulations.

## 1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

## 1.09 MAINTENANCE

A. Extra Materials: Furnish as specified below. Make interchangeable with and same material and workmanship as corresponding original parts.

1. Provide manufacturer recommended spare parts.

B. All ultraviolet disinfection equipment furnished under this Section shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall operate satisfactorily when installed as shown on the Drawings

C. Contractor shall confirm that proposed UV equipment meets the design requirements listed in Article 2.02.C, the contract specifications and the drawings. Disinfection equipment shall be:

1. Trojan Technologies, Inc.

2. Calgon Carbon Corporation

3. Aquionics, Inc.

4. Or approved equal.

D. The UV Manufacturer shall be regularly engaged in the manufacture of UV systems with a proven track record of at least twenty-five (25) comparably sized municipal drinking water application for disinfection credits, ~~each with a~~ fourteen (14) of which shall have a flow rate of at least 1.0 USMGD (158 $m^3$/hr.). The manufacturer shall provide documentation of their experience with UV disinfection systems in municipal drinking water applications.

E. The UV Manufacturer shall submit a Bioassay Validation Report for the proposed reactor. The bioassay testing and results shall have been validated by a qualified independent third ($3^{rd}$) party in full compliance with EPA 815-R-06-007, *Ultraviolet Disinfection Guidance Manual For The Final Long Term 2 Enhanced Surface Water Treatment Rule*, released November 2006 and MassDEP's Guidelines and Policies. Bioassay testing shall evaluate reactor performance over the range of flow rates from 0.3 to 4.8 USMGD, UV Transmittance (UVT) from 70% to 98% (measured at 254 nm, 1 cm path length) and MS2 Reduction Equivalent Dose (RED) ranging from 10 to 80 mJ/$cm^2$, or T1 Reduction Equivalent Dose (RED) ranging from 2 to 24 mJ/$cm^2$. The bioassay testing must encompass the range of design and operating conditions described herein. ***Extrapolations to flow rates, UV Transmittance values, or UV doses outside the range actually tested, shall not be permitted.*** Bioassay testing shall also verify that the headloss generated by the proposed reactor is less than or equal to the specified limits.

F. Submittals from the UV manufacturer shall include a complete and detailed proposal of equipment offered, including the number of lamps proposed and a detailed description of any exceptions taken to the specification as well as documentation of the UV manufacturer's service capabilities including location and experience.

G. Regulatory Approvals

1. The equipment must be approved for this use by the Massachusetts Department of Environmental Protection prior to finalizing the equipment purchase.

H. Pre-Construction Testing

1. As required under "Independent Testing" below.

I. Independent Testing

1. Validation and reporting shall be performed in accordance with the EPA Ultraviolet Disinfection Guidance Manual and the MassDEP Guidelines for Public Water Systems. It is the Contractor's responsibility to supply and/or develop all supporting documentation on the specific equipment proposed for this project necessary for the equipment to be approved by the MassDEP.

J. Certifications

1. National Sanitation Foundation (NSF) Standard 61 approved for use in potable water applications for complete reactor and all appurtenant wetted components.

2. National Sanitation Foundation (NSF) Standard 60 approved for use in potable water applications for chemical reagents and/or solution.

K. Samples

1. None required.

L. Mockups

1. None required.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirement

B. Acceptance at Site

1. Upon delivery to the site, equipment packages shall be opened, inspected and accounted for.

2. Confirm spare parts and length of cables are provided as specified. Spare parts shall be packed in containers bearing labels clearly designating contents and pieces of equipment for which they are intended.

b. The RED shall be delivered by each unit under the Peak (Design) Flow and Design UVT condition specified in 2.02.A.1.

c. The minimum dose shall conform to the current guidelines of the Low Wavelength UV Disinfection Work Group to address medium-pressure UV action spectra validation issues. The manufacturer shall provide a statement regarding the actions taken through equipment design, validation or correction factors, if necessary, to address these issues. In the event that revalidation has not been conducted or irradiation at wavelengths below 240nm is allowed to penetrate the water, a blanket correction factor of 1.3 shall be applied to the sizing calculations to account for action spectra and other validation factors. Sizing calculation demonstrating the use of this correction factor, if require, shall be provided with the submittal.

d. RED must be verified by third party witnessed bioassay testing per Article 1.06.

3. Hydraulics:

a. Headloss through each UV reactor shall not exceed 5 inches of water at 1,250 gpm.

B. System Components:

1. The UV system shall be comprised of the following components:

| | | |
|---|---|---|
| a. | UV Reactors: | 3 total (2 duty + 1 standby) |
| b. | Number of lamps per reactor: | As necessary to meet specified RED requirements |
| c. | Expandability: | ~~Reactors shall be configured to accept additional lamps after installation to address future demands.~~Each Vendor shall provide the maximum number of lamps for their reactor. |
| d. | Control Power Panel(s): | 1 per reactor |
| e. | UV Intensity Sensor(s): | 1 per lamp |
| | Automatic Cleaning System: | On-line Mechanical/Chemical or Mechanical |

C. Performance Requirements:

1. Each UV Reactor shall be capable of providing the RED necessary for 1 log of Cryptosporidium at the Peak (Design) Flow and Design UVT condition specified in 2.02.A.1.

2. ~~The selected reactor shall be configured to accept additional lamps (the maximum number of lamps for the selected reactor) to provide expandability for future demand and treatment capabilities.~~Each Vendor shall provide that maximum number of lamps for their reactor.

3. The system shall be able to continue providing disinfection while the automatic cleaning system is in operation. The system shall be capable of operating without disruption due to fouling at manganese concentrations of 0.5 mg/L or less.

4. The system shall be able to continue providing disinfection while the UV intensity sensor calibration is being checked.

5. System shall be designed to operate in an environment with ambient relative humidity of 5-90% and ambient air temperature of 0-40ºC.

6. The UV Reactor shall be of welded construction manufactured from Type 316L stainless steel. The UV Reactor shall be pickled, passivated and bead blasted for uniform external finish.

7. UV Reactor shall occupy a plan footprint no greater than 6 $ft^2$. To be considered as an alternate, UV Manufacturers whose reactors occupy greater than 6 $ft^2$ shall demonstrate to the satisfaction of the Engineer the proper placement of the reactor within the current design layout.

8. The UV Reactor shall be designed to handle a maximum operating pressure of 150 psig, and shall be fully assembled and hydrostatically tested to 1.5 times the rated operating pressure, for at least 10 minutes without leakage, in the factory prior to shipment.

9. Each UV Reactor shall be a nominal 12 inches in diameter. Each UV Reactor shall be supplied with 12 inch ANSI 150 lb. flanged inlet/outlet connections. To be considered as an alternate, UV Manufacturers whose reactor diameter is greater than 12 inches shall demonstrate to the satisfaction of the Engineer the placement of the reactor within the current design layout meets the required geometric validation conditions and any applicable MassDEP installation requirements and that adequate space for operations and maintenance is available. Any additional costs, including construction and engineering costs, associated with use of reactor diameters greater than 12 inches shall be the responsibility of the Contractor.

10. The UV system design length, including EPA and MassDEP required upstream and downstream piping and reactor operations and maintenance areas, shall fit within the building footprint and piping system as shown on

the Drawings. To be considered as an alternate, UV Manufacturers whose UV system design length differs from the length shown on the Drawings shall demonstrate to the satisfaction of the Engineer the design layout meets required geometric validation conditions, the EPA and MassDEP installation requirements (noted below) and that adequate space for operations and maintenance is available. Any additional costs, including construction engineering costs, associated with an alternate design that requires a larger building footprint and piping system and is approved by the Engineer, shall be the responsibility of the Contractor.

a. Minimum Installation Requirements

1) Required Upstream Stream Straight Length: validation straight length plus five (5) pipe diameters.

2) Required Downstream Straight Length: five (5) pipe diameters.

3) Neither control valves nor changes in pipe diameter shall be allowed within the upstream and downstream straight length.

11. Each UV reactor shall consist of high intensity medium pressure UV lamps.

12. Each lamp shall be enclosed in an individual quartz sleeve, one end of which shall be closed and the other sealed with compressed O-rings or both ends sealed with compressed o-rings.

13. Each quartz sleeve shall be independently sealed within the reactor.

14. The UV reactor shall be designed such that operating personnel at the plant can change the lamps without draining the reactor.

15. The UV reactor shall be provided with access ports for easy access to the quartz sleeves and cleaning system.

16. All access for reactor components, including lamps, sleeves and cleaning system shall be from the same side. UV Manufacturers whose design requires access from more than one side of the reactor shall demonstrate to the satisfaction of the Engineer the placement of the reactor within the current design layout provides adequate space for operations and maintenance. Any additional costs, including construction and engineering costs, associated with use of a reactor requiring access from more than one side shall be the responsibility of the Contractor.~~Designs requiring access from more than one side of the reactor are not permitted~~.

17. Piping shall be designed so that the reactor will be full of water at all times. Air trapped in the reactor shall result in reactor shut down to avoid overheating.

18. UV reactor shall be provided with a drain port.

19. The UV Lamps shall reach maximum UV output within three (3) minutes (defined as the warm-up period).

20. All wetted components within the reactor shall be NSF 61 certified.

D. UV Lamps:

1. The UV lamps shall be high intensity, medium pressure type.

2. The filament shall be significantly rugged to withstand shock and vibration.

3. The lamp bases shall be resistant to UV and ozone.

4. The lamps shall be operated by variable output electronic or electromagnetic ballasts with 1% power increments or stepped power, from 40% to 100% of full rated output.

E. UV Lamp Sleeves:

1. The UV lamp sleeves shall fully annealed clear fused quartz tubing.

~~2. Lamp sleeves shall be domed at one end.~~

~~3.~~2. The open end of the lamp sleeve shall be sealed by means of an O-ring and Type 316 stainless steel compression plate.

F. UV Intensity Sensor(s):

1. The UV Intensity Sensor(s) shall be located inside the reactor and contained within protective quartz sleeves.

2. One (1) sensor shall be provided per lamp.

3. Sensor(s) shall incorporate SiC diodes, and provide NIST-traceable measurement with a total absolute uncertainty of 15% or less at an 80% confidence level. Provide documentation that sensors meet NIST.

4. Sensor(s) must meet the requirements of the EPA 815-R-06-007. Sensor(s) must filter out wavelengths below 240 nm, and have a spectral response peaking between 250 nm and 280 nm with less than 10% coming from wavelengths greater than 300 nm.

5. The complete Sensor assembly and the internal circuit board containing the diode shall each be serialized.

6. The sensors shall be calibrated to account for lamp geometry.